

Example 2:

(a) Find the weight of a 50 kg person on Earth, using  $F_g = mg$ .

$$F_g = mg$$
$$= 50 (9.8)$$

$$F_g = 490 \text{ N}$$

(b) Find the same weight on Earth, using  $F_g = G \frac{Mm}{R^2}$ .

$$F_g = \frac{GMm}{r^2}$$

*mass of Earth*

$$= \frac{(6.67 \times 10^{-11}) (5.98 \times 10^{24}) (50)}{(6.38 \times 10^6)^2}$$

$$F_g = 490 \text{ N}$$

(c) Find the weight of this person at an altitude of 170 km.

$$r = [6.38 \times 10^6] + [170000]$$
$$= 6.55 \times 10^6 \text{ m}$$

$$F_g = \frac{(6.67 \times 10^{-11}) (5.98 \times 10^{24}) (50)}{(6.55 \times 10^6)^2}$$

$$F_g = 465 \text{ N}$$